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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/567,325

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EXAMINER

BEST, ZACHARY P

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

11/13/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/567,325	<b>Applicant(s)</b> AKIYAMA ET AL.	
	<b>Examiner</b> Zachary Best	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 October 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

**FUEL CELL SYSTEM HAVING A VAPOR-LIQUID SEPARATION  
MEMBRANE AND A CARBON DIOXIDE PERMSELECTIVE MEMBRANE**

Examiner: Z. Best    S.N. 10/567,325    Art Unit: 1795    November 7, 2008

**DETAILED ACTION**

1. Applicant's amendment filed on October 9, 2008 was received. The specification was amended. Claims 1 and 6 were amended. Claim 2 was cancelled.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Specification***

3. The objection to the specification is withdrawn because the title of the invention was amended.

***Claim Rejections - 35 USC § 103***

4. The claim rejections under 35 U.S.C.103(a) as being unpatentable over Ren et al. (US 2003/0157395 A1) and Roberts (US 3,556,161) on claims 1,3-5 are maintained.

Regarding Claim 1, Ren et al. teach a fuel cell system comprising a fuel cell (2) provided with a fuel electrode (8), an oxidant electrode (10), and an electrolyte membrane sandwiched between them (6), and a fuel supply system supplying a liquid fuel (par. 35) to said fuel electrode (4) comprising a gas discharge unit (30) provided with a filter at a part of a

member which excludes a reaction part of said fuel electrode and is in contact with the fuel (par. 42), wherein said filter is a membrane incorporated into a layered structure (fig. 2), wherein said membrane comprises porous PTFE, which acts as a gas permeable layer (vapor-liquid separation membrane, par. 42). However, Ren et al. does not specifically teach the membrane is a carbon dioxide permselective membrane.

Roberts teaches a membrane consisting of a porous layer of PTFE (substrate) and a nonporous layer of PTFE (col. 16, lines 48-68), which may be used as filtering media in fuel cells (col. 7, lines 64-75). The nonporous layer of PTFE would inherently be permselective to carbon dioxide as evidenced by Pinnau et al. (US 2004/0050250 A1). It would be advantageous to use the membrane of Roberts because the structure has increased tensile strength (col. 7, lines 32-50). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the fuel cell system of Ren et al. wherein the filter is constituted of a porous layer of PTFE and a nonporous layer of PTFE provided on said porous layer because Roberts teaches improved tensile strength of the membrane from the two different layers. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. *In re Robertson*, 49 USPQ2d 1949 (1999).

Regarding Claim 3, Ren et al. teach that pressure is required to push the carbon dioxide gas through the membrane (par. 43). A thicker membrane would inherently require more pressure to push the carbon dioxide across the interface. Therefore, it would have been obvious to one having ordinary skill in the art to adjust the pressure required to push

the gas across the membrane by changing the thickness of the membrane because Ren et al. teach a pressure differential is required to make the gas separation succeed.

Regarding Claim 4, Roberts teaches the substrate is a porous membrane (col. 16, lines 48-68).

Regarding Claim 5, Ren et al. teach that the gas discharge unit is provided with a chamber communicated with said fuel supply system through said filter (30), and a catalyst is disposed in said chamber (par. 51).

5. The claim rejections under 35 U.S.C.103(a) as being unpatentable over Ren et al. (US 2003/0157395 A1) and Roberts (US 3,556,161) as applied to Claims 1 and 3-5 above, and further in view of Okuyama et al. (JP 2003-223920 A) on claim 6 is maintained.

Ren et al. in view of Roberts teach the fuel cell system as recited in Paragraph 4. However, Ren et al. in view of Roberts fail to teach a first chamber with said filter and a second chamber with a catalyst.

Okuyama et al. teach a fuel cell system comprising a first chamber with a gas separation means communicated with the fuel supply system (3, drawing 2) and a second chamber (52) that is communicated with said first chamber (drawing 2) and provided with a catalyst in the chamber (par. 16). It is advantageous to use the two chambers as taught by Okuyama et al. because it keeps byproducts of the fuel cell reaction from being discharged outside the fuel cell system (pars. 6-7). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to create the fuel cell system of

Ren et al. in view of Roberts with a gas charge unit provided with a first chamber that has an air port provided with a filter and is communicated with said fuel supply system through said filter, and a second chamber communicated with said first chamber and provided with a catalyst in the chamber because Okuyama et al. teach the system keeps byproducts of the fuel cell reaction from being discharged outside the fuel cell system.

### ***Response to Arguments***

6. Applicant's arguments filed on October 9, 2008 have been fully considered, but they are not persuasive.

*Applicant argues:*

*(a) Ren et al. does not provide a filter comprising a vapor-liquid separation membrane substrate and a carbon dioxide permselective membrane provided on said substrate.*

In response to Applicant's arguments:

(a) In the Office Action sent on July 9, 2008, Examiner cited that Ren et al. taught a filter on a substrate (anode diffusion layer). However, the claim rejection of Claim 1 has been clarified to illustrate that Ren et al. teach a membrane as being part of a layered structure (one layer being a substrate for another). Regardless, Ren et al., as stated in the Office Action dated July 9, 2008 and above for convenience, is taught in view Roberts, which teaches a membrane consisting of a porous layer of PTFE (substrate) and a nonporous layer of PTFE (membrane) (Roberts, col. 16, lines 48-48), which may be used as

filtering media in fuel cells (Roberts, col. 7, lines 64-75). Ren et al. teach that a porous layer of PTFE will inherently be a vapor-liquid separation membrane (Ren et al., par. 42), and Pinnau et al. teach that a non-porous layer of PTFE will inherently be permselective to carbon dioxide (par. 217).

### ***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zachary Best whose telephone number is (571) 270-3963. The examiner can normally be reached on Monday to Thursday, 7:30 - 5:00 (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

zpb

/Dah-Wei D. Yuan/  
Supervisory Patent Examiner, Art Unit 1795